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Promotion Opportunities of Minorities to the Controlled Grades in the Navy Nurse Corps

by

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Submitted in partial fulfillment
of the requirements for the degree of

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ABSTRACT

Nursing is an overwhelmingly white, female occupation, a situation that has continued despite years of shortages in the nurse labor market as well as a general blurring of gender and racial/ethnic roles in society. This thesis analyzes the promotion opportunities of minorities (which includes men in nursing) to the controlled grades in the Navy Nurse Corps. Data are drawn from the Officer Master Files and the Officer Summary Records. Multivariate logistic regression models are estimated for each controlled grade; the models control for demographic, education, and Navy experience factors. Minority status and gender are found to be statistically insignificant factors affecting promotion at the Captain and Commander selection levels; however, at the Lieutenant Commander selection level, gender and minority status have a statistically significant negative effect on promotion. The thesis suggests further areas of research that will be necessary to identify other performance factors that may be associated with promotion differences by race/ethnic or gender status.

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I. INTRODUCTION

A. OVERVIEW

The Navy Nurse Corps has always toiled with the task of merging the roles of both Naval officer and professional nurse. This dual role involves all aspects of the organization, including the fundamental structure on which it exists. On the one hand, the Nurse Corps is dedicated to establishing an environment of equal opportunity, a goal shared by the U.S. Navy. At the same time, the Nurse Corps draws its members from the nation's registered nurse population, a population that is not only predominantly female but overwhelmingly of white, non-Hispanic background.

The country has been dealing with a shortage of nurses for the past twenty years, with rare and brief periods of exception. Neither government grants for nursing education, the appeal of a high rate of employment, nor improving salaries and benefits have brought long-term relief to the nurse labor market.

Yet, despite the long-standing need for nurses, the profession has failed to attract a proportionate representation of minorities or men to its ranks. The American Nurses Association (ANA), citing figures from the U.S. Department of Health and Human Services, notes that the

percentage of racial/ethnic minority nurses actually declined from 10.5 percent in 1984 to 7.6 percent in 1988. The proportion of men in nursing remained stable at 3.3 percent for the same period. (ANA, 1991)

The Nurse Corps has strived for years to provide an environment that is attractive and satisfying to individuals of a variety of backgrounds, each contributing their special talents to the community. Perhaps as a result of these efforts, the participation of minorities and men in the Nurse Corps is considerably higher than in the civilian sector (Defense Manpower Data Center statistics, 1991).

An important aspect of any person's career choice is that opportunity for promotion be contingent upon performance. The military structure, which reviews all members of a particular rank and time-in-grade for promotion, facilitates the study of advancement opportunities in a manner unparalleled in the civilian sector. Such study can reveal the progress of various groups as well as areas of potential problems.

As the Nurse Corps attempts to fill its ranks in the midst of a national nursing shortage, the relationship between retention and promotion cannot be ignored. The opportunity for promotion to senior positions in the internal labor market of the military can only occur if the organization is successful in retaining the member in the organization. The dependency of promotion on retention is not entirely one-sided, however. Retention is also influenced by promotion, or

more accurately the perception of promotion opportunities by the service members.

B. STRUCTURE OF THIS STUDY

The research in this paper is exploratory in nature and intended to assist the Navy Nurse Corps in the evaluation of promotion opportunities for minorities. An examination of promotion patterns to grades O-4 through O-6 will reveal historical trends in the composition of the senior ranks of the Nurse Corps. In the same manner, such an examination can shed light on aspects of the environment in which junior officers are making career decisions.

In a relatively rare reversal of occupational patterns, males not females are the minority in the field of nursing. As noted earlier, males account for 3.3 percent of civilian nurses, but males now account for approximately 26 percent of Navy nurses. The success in attracting this segment of the nursing population to the Navy is clear. A primary research question that will be examined here is whether promotion opportunities differ for males and females in this female-dominated field.

By the same token, according to statistics of Defense Manpower Data Center, the Navy Nurse Corps demographics show approximately 13 percent of Navy nurses on active duty belong to a racial or ethnic minority group. This demonstrates the ability of the Nurse Corps to attract minority nurses as well.

The other primary research question to be explored is whether these groups encounter promotion opportunities that are different from the majority.

Chapter II presents a literature review in order to establish a basis for the various concerns impacting the Navy Nurse Corps. Some of the elements unique to nursing, such as entry into practice issues and the role of minorities and men in this predominantly white, female field are discussed. Since the Nurse Corps is also a military organization, pertinent studies of military retention and promotion are presented.

A description of the data and the methodology used in this study are presented in Chapter III. As progress toward an answer to the research questions, three empirical models were estimated (one for each of the controlled grades of Lieutenant Commander, Commander, and Captain) utilizing a multivariate logistic regression. These models attempt to estimate the probability of promotion as a function of various demographic and experience/education factors. The data were drawn from the Officer Master Files and the Officer Summary Records.

The number of variables found to be significant is different in each equation, however measures indicate that the overall "fit" of each model is adequate. Minority and gender variables are found to be statistically insignificant at the Captain and Commander selection points; however, both are statistically significant with a negative coefficient at the

Lieutenant Commander selection level. The results of the models are presented in Chapter IV. Conclusions from these findings are presented in Chapter V, along with policy recommendations and suggestions for further research.

II. LITERATURE REVIEW

A. INTRODUCTION

A member of the Navy Nurse Corps carries the responsibilities of a dual role, both as a Naval officer and a professional nurse. Any study of promotion in a given field, often considered a measure of success, entails much more than just annual statistics. There are many issues involved in attaining success in this dual role. For a better understanding of promotion selections, one must have a feel for how this group of individuals came to be in a position of consideration.

This chapter attempts to familiarize the reader with the many aspects involved in reaching a selection board to the controlled grades in the Navy Nurse Corps. Attention will be directed to the image and composition of the profession of nursing, entry into practice, the role of minorities and men in civilian as well as Navy nursing, and characteristics of retention and promotion in the military.

B. NAVY NURSE CORPS POPULATION

The history of the Navy's Equal Opportunity program is rooted in the Civil Rights Acts of 1964 and 1968 as well as several subsequent Chief of Naval Operations directives from the 1970s. The 1980 Navy Affirmative Action Plan set overall

minority officer end-strength goals of six percent black and three percent Hispanic based on national proportions of these groups holding college degrees. The Navy continues to progress toward these goals with 4.3 percent Black and 2.5 percent Hispanic representation in the officer ranks (including warrants) as of 31 December 91. However, in the senior ranks (O-4 and above), these figures drop to only 2.6 percent black and 1.3 percent Hispanic. As of that same date, 11.2 percent of the officers were women. (U.S. Department of Navy, February, 1992)

The Navy Nurse Corps statistics indicate higher rates of minority representation. According to figures from the Officer Master Files maintained in the Defense Manpower Data Center (DMDC) in Monterey, California as of 30 September 91, 6.0 percent of the Nurse Corps officers were black and 3.1 percent were Hispanic. Even in the controlled grades of O-4 and above, 3.8 percent of the Nurse Corps was black and 1.9 percent Hispanic.

In a relatively rare reversal of American occupational patterns, the Nurse Corps is 74.2 percent female and 25.8 percent male. While this is very different from the gender representation in the overall Navy officer composition as noted above, it is also quite different from the civilian Registered Nurse (RN) population, which is only 3.3 percent male. (ANA, 1991)

nurses, break down discrimination in the nursing profession, and develop leadership within the ranks of black nurses." (Rowland, 1978, p. 769) In 1948, the American Nurses Association began efforts to promote unity and remove barriers between the groups with such success that black nurses voted, in 1951, to dissolve the AACGN. By 1971, to better focus on common concerns of black nurses including recruitment, education, support, and nursing care for black consumers, the American Black Nurses' Association was formed. (Rowland, 1978, p.769) In 1976, the forerunner of the National Association of Hispanic Nurses was formed with similar mandates. (Wilson, 1991-1992)

Meanwhile, nursing in the military was taking hold. Nurses have assisted the military in times of conflict since the early days of this nation's history. The Army Nurse Corps was established in 1901, and the Navy Nurse Corps in 1908. The first record of black nurses in the Navy is in 1945 with four on active duty; however, by one year later only one remained. ("Two of the wartime nurses had resigned to marry and the third was on inactive status attending college....During the Navy's 1946 recruitment drive to attract 1,000 new nurses, only one Negro applied, and she was disqualified on physical grounds.") (MacGregor, 1981, p 248)

Many milestones in the advancement of men and minorities are noted in the History of the Nurse Corps (U.S. Department of Navy, 1991). In November, 1964, the Secretary of the Navy

approved changes allowing male nurses in the Navy Nurse Corps and in August, 1965, George M. Silver was commissioned Ensign. In 1975, CDR J. Barnes was the first Black Director of Nursing Services (DNS) at a Naval Hospital (Guam), and in 1978, Joan Bynum was the first Black nurse promoted to the rank of Captain. Clarence W. Cote was the first male NC officer appointed DNS (Groton) in 1983, and was also the first male promoted to Captain that same year.

By the 1980s, nurses were moving into command positions as well. RADM Shea was the first NC Commanding Officer (CO) in charge of the Navy's Health Sciences Education and Training Command in 1980. CAPT Hall was the first NC Commanding Officer of a Naval Hospital (Guantanamo Bay, Cuba) in 1983. CAPT Cote was the first male NC Commanding Officer (also Guantanamo Bay) in 1985. And in 1986, CAPT J. Barnes was the first black NC Commanding Officer (Naval Hospital, Great Lakes). (U.S. Department of Navy, 1991)

Other changes were taking place that impacted the Navy Nurse Corps in different areas. Congress passed the Defense Officer Personnel Management Act (DOPMA) that became effective in 1981. This act, among other things, limited the number of personnel (including staff corps) in the senior ranks (O-4 and above). When DOPMA went into effect, the Nurse Corps instantly exceeded its limits in the newly controlled grades of O-4 through O-6. LCDR Quisenberry of the Navy Bureau of Medicine and Surgery explains:

> Prior to 1981, Nurse Corps officers were promoted with an unrestricted line 'lineal running mate'--when your line counterpart went before a selection board, you went before a selection board; if selected, you were promoted when your lineal running mate was promoted. DOPMA repealed this running-mate system. This [running-mate] system promoted staff corps officers to the next higher grade regardless of authorizations. (Quisenberry, 1992, p. 1)

DOPMA limitations and the overages that the former system produced resulted in reduced promotion opportunities and increased flowpoints throughout the 1980s that the Nurse Corps is still trying to resolve. As of FY91 selection boards, promotion opportunity (in this sense, defined as the maximum percentage of in-zone officers a board may legally select for promotion) is within DOPMA requirements with the help of grade compensation from other communities; however, high flowpoints are expected to continue for some years yet. (Flowpoint to Commander in the NC reached a high of 18 years, 8 months in FY90, compared to the unrestricted line flowpoint to Commander of 15 years, 4 months at that time.) (Quisenberry, 1992)

Also in the mid-80s, the pinch of a national nursing shortage was being felt. Civilian hospitals responded by increasing salaries and benefits, both of which are difficult to quickly implement in the military. The Navy NC did not meet its recruiting goals for the first time in recorded NC history in October, 1986 (U.S. Department of Navy, 1991). By 1989, with promotion looking bleak and civilian opportunities improving, retention in the NC began to suffer, which increased the recruitment goals even further. Continuation

rates, historically between 90 and 93 percent overall, dropped to 86 percent, and those of nurses completing three years of service fell from 78 percent in 1985 to 62 percent in 1989. (Turner, 1990)

G. STUDIES OF MILITARY RETENTION AND PROMOTION

During this time, renewed attention was directed to keeping qualified officers in the service. Many studies were conducted which focused on retention of female military officers (and military nurses in particular), applying several prominent turnover theories. In a number of cases, a variable to capture the individual's perceptions regarding promotion opportunities was a significant factor in predicting turnover behavior. This was noted time and time again: "...the more dissatisfied an individual was with promotion, the more likely he/she would leave the military." (Shigley, 1988, p. 44); "The variables with the strongest influence were routinization, instrumental communication, promotional opportunity, and participation." (Lensing, 1984, p. 33); "It can be concluded from this finding that the opportunity for advancement supplants job satisfaction as the greatest contributor to remaining in the Navy over time for female officers." (Lowell, 1987, p. 76). In a study evaluating the quality of work life in the Navy Nurse Corps in 1987, Hilton found "...most [nursing] specialty groups were negative about advancement opportunities." (Hilton, 1987, p.49)

Navy Nurse Corps officers belonging to minority groups have perhaps felt the impact of the Nurse Corps manpower problems most acutely. Restrictions in promotion opportunities occurred just as minority nurses were beginning to move into senior leadership positions. These frustrations were evident in the report of the ethnic minority study group, a two-day workshop to "explore and delineate issues," which was held in August, 1991. Negative phrases such as "lack of career development opportunities" and "fewer promotion opportunities" were frequent and reflect the deep dissatisfaction among minority nurses. (Bureau of Medicine and Surgery, August, 1991)

Promotion in the military is generally considered to be a function of seniority as well as performance. Studies regarding promotion in the military are facilitated by the fact that, for the most part, all officers within a certain cohort, or year group, go before a selection board at the same time. (This is not as often the case in civilian organizations, where the system is not so tightly restricted to a hierarchical, internal labor market.) Two of these studies (Bowman, 1990; Foster, 1990) are reviewed below.

In a study of Naval Academy graduates, Bowman (1990) developed an empirical model to determine the affects of undergraduate major (technical versus non-technical) on the performance of officers. The model attempted to predict the probability of being rated a superior performer as measured by

a combination of items taken from the officer fitness reports. In addition to academic major, grade point average, and warfare qualifications, control factors were included in the model to hold constant the impact of personnel characteristics (among these were race, marital status, and others). His findings indicated that "racial minorities are from 19.2 percent to 25.6 percent less likely than whites to achieve superior junior officer status in the conventional surface navy...." (Bowman, 1990)

Utilizing Bowman's methods of measuring the probability of being rated a superior performer as per fitness report data, Foster (1990) developed an empirical model to assess the impact of various accession sources on performance of Naval officers. Once again, race was included in the model as a control factor. Again, his findings note that "race has a statistically significant effect on the probability of being a superior performer: non-white officers were less likely to be superior performers in all three models." (Foster, 1990)

If it is true that minority officers are less likely to be rated as superior performers, then their ability to compete for promotion could be negatively affected. But who is doing the rating of these officers and on what criteria? A letter from the U.S. Navy Surgeon General (Bureau of Medicine and Surgery, March, 1991) discusses potential cultural differences among Naval officers and cautions against bias entering into the writing of fitness reports in the Navy Medical Department.

H. RETENTION AND PROMOTION

No discussion of promotion to the senior ranks of a military organization would be complete without stressing the related issue of retention. The military is generally structured as an internal labor market, in which entry is allowed only at the lowest rank and higher ranks are filled only with the promotion of members in the next lower rank. The Navy Nurse Corps does not entirely fit this model in that nurses are less restricted in entry levels in two respects: (1) nurses may be granted entry grade credit for education or significant nursing experience, and (2) there have been times of voluntary recall of reserve nurses to active duty. Even so, entry is for the most part restricted to the junior grades (O-1 through O-3).

The decision of these nurses to stay in or leave the military after an initial period of obligation is usually a personal choice, as opposed to the organizational choice of selection for promotion. As mentioned earlier, studies of retention of military nurses reveal that such choices often reflect satisfaction with the current job tasks, working conditions, working relationships, promotion opportunities, and other job alternatives. As in all military units, decisions of the junior officers to stay or leave are critical to the future composition of the Nurse Corps. No promotion system can challenge these nurses to increased levels of

responsibility if they choose to leave the system prior to the selection opportunity.

Career choices are based on personal perceptions and decisions are made regarding these complex issues. However, unintentional slights or misinterpreted perceptions can result in a real loss to the Nurse Corps. A complete study of retention of minority nurses is beyond the scope of this thesis. It is encouraging to note that the NC currently has attracted 7.9 percent black and 4.1 percent Hispanic in the Ensign and Lieutenant (Junior Grade) ranks. (DMDC statistics as of 30 September 91) Further research in this area is recommended to keep these nurses in the Navy.

I. SUMMARY

This chapter indicates that any study of promotion, particularly to the higher levels of the Nurse Corps, entails much more than just annual statistics. Many issues are involved in attaining success in this dual role of Naval officer and professional nurse.

These issues concern all aspects of the employment spectrum. Childhood aspirations are shaped by society's image of the profession of nursing; school systems prepare (or do not prepare) the young adult for career choices; the ability to invest time and money in the confusing array of education impacts entry into nursing practice; military culture and structure may provide a vastly different set of circumstances

than the civilian setting, particularly for the male or minority nurse; perceptions of job satisfaction, promotion opportunities, and interpersonal working relationships can affect a person's choice to stay in or leave military service; promotion to the upper grades of the Nurse Corps is impossible without retention in, and progression through, the lower grades. All of these must be included for a clearer understanding of the forces involved in Nurse Corps promotion.

Given this background, the following chapter will describe the methodology used in this study of promotion opportunities of men and minorities in the Navy Nurse Corps.

III. DATA AND METHODOLOGY

A. DATA SET

The data for this exploratory thesis were collected from two sources: (1) the Officer Master Files (OMF) maintained at the Defense Manpower Data Center (DMDC) in Monterey, California, and (2) the Officer Summary Records (OSR) maintained at the Naval Personnel Research and Data Center (NPRDC) in San Diego, California.

Since the deliberations of a selection board are confidential and all board members are sworn to secrecy, the criteria for selection to the next higher rank are not entirely clear. Because of this, the author used the common career advice that one hears throughout one's tenure in the Nurse Corps. This concept includes: the pursuit of education; a wide variety of experiences drawn from assignments to a large duty station, an overseas duty station, and a non-hospital billet; and augmentation to regular Navy status.

Information was requested from DMDC on all active duty Nurse Corps officers in the grades of Lieutenant through Commander (O-3 through O-5) at the end of each fiscal year (FY) from 1982 through 1991. Data retrieval difficulties prevented accessing data from FY83 and so the dates actually included were FY84 to FY91. Social Security Number (SSN) was

used to compile a longitudinal promotion history for each individual (as well as to merge additional data on the same individual, as will be noted shortly). Names of the individuals were never accessed, and complete SSNs were never printed to preserve the anonymity of the observations.

One field of data from the OMF, noting the promotion status of an individual, is only complete on records of those individuals who have been before a promotion selection board in that year; thus, records of individuals who had not been before a selection board to the next higher rank were deleted from the data set. Given that an individual who fails to select for promotion in one year continues to go before successive boards until that person is selected or leaves the service, multiple observations on a single individual in the data set were possible. All data regarding a single individual were then collapsed into a single observation, preserving the relevant information from those observations.

The data were then separated by rank into three distinct groups: (1) Lieutenants who had been before a Lieutenant Commander selection board, (2) Lieutenant Commanders who had been before a Commander selection board, and (3) Commanders who had been before a Captain selection board. Irregularities were noted in the promotion status field within the group of Lieutenants for FY84 through FY86. This may have been because in those years data were retrieved as of 30 June rather than 30 September. Since the selection board for promotion to

Staff Lieutenant Commander is convened in June each year, it may be that the records of individuals considered in those boards were not properly updated at the time of data collection. Thus, the data for the group of Lieutenants were restricted to FY87 through FY91. This resolved the discrepancies noted for this group while preserving a data set of sufficient size. The change in data collection dates had no discernable impact on the groups of Lieutenant Commanders and Commanders.

Data regarding the duty station and the duties assigned were taken from the OSR, which comes directly from the Officer Fitness Report. It was noted that the duties described on the OMF may reflect the billet the individual filled and not necessarily the actual duties that were performed. Thus, the OSR data were used in an attempt to accurately capture potentially important experiences. This data set was merged with the OMF data set using SSN. In the end, information regarding the duties assigned to the officer (i.e., division officer, department head, and the like) was not used in model estimation. A progression of increasing responsibility in the jobs assigned is apparently closely correlated to rank and time in service, and nearly all of the observations recorded similar levels of management experience.

No attempt was made to include fitness report grades or to quantify differences in the written portion of the Fitness Report. While the impact of variations in fitness report

performance can be expected to strongly influence selection outcomes, this form of evaluation by its very nature tends to be subjective. Because a full examination of the evaluation process was felt to be beyond the scope of this thesis, the study was limited to more objective measures of officer performance.

The original data sets of the three grades contained 258 Commanders (FY84 through FY91), 791 Lieutenant Commanders (FY84 through FY91), and 761 Lieutenants (FY87 through FY91). Observations with incomplete data and missing values were deleted; reserves recalled to special duty (such as Desert Storm) were also deleted as these officers do not compete in the same selection boards. Thus, the final data sets contained observations for 210 Commanders, 691 Lieutenant Commanders, and 661 Lieutenants.

B. SPECIFICATION OF THE VARIABLES

The original goal was to use a dependent variable, SELECTED, that reflected whether the service member was ever promoted to the next higher rank (in-zone or above-zone selection). Prior selection history was to be captured in an independent variable, SELHIST, which denoted whether the member had been selected having never been before a selection board for the given rank before (SELHIST=0), had failed to select once (SELHIST=1), had failed to select twice (SELHIST=2), or had failed to select three or more times

(SELHIST=3). However, when the model was run with SELHIST included among the other independent variables, the selection history of the observation completely dominated the outcome. Hence, the variable, SELHIST, was dropped and the model respecified for two reasons: 1) the promotion opportunity for in-zone versus above-zone observations is radically different, and 2) the previous selection board outcomes are historical in nature and do not contribute to the forecasting ability of the model.

The revised dependent variable, FIRSTCUT, depicts in-zone selection only. It indicated that the individual was selected for promotion (SELECTED=1) and had not been before a board previously (SELHIST=0). If both of these conditions were true, then FIRSTCUT=1. All observations not meeting these conditions were denoted FIRSTCUT=2. The notation (1,2) was used rather than the common (1,0) for the dependent variable for ease in working with the Statistical Analysis System's logistic regression program and does not alter the outcome. (SAS Institute, 1989)

Board review for below-zone candidates is not considered a failure to select and is not recorded on the OMF. Also, below-zone selections were not differentiated from in-zone selections on the OMF field that indicated promotion status. However, given the constraints of DOPMA described in the previous chapter, below-zone or "deep" selections are

extremely rare in the NC; when they occur they are included in the in-zone figures.

The independent variables were selected in an attempt to control for various factors that may influence the promotion outcome. These will be discussed below.

The variable, MINORITY, was drawn from the OMF and reflects whether the individual belonged to a minority group. Because of the relatively small numbers of minorities (see Section D for sample statistics) in the data set, all observations claiming Caucasian race and "none" or "unknown" ethnic origin were grouped together (code 0) and all observations claiming another race, specifically listed ethnic backgrounds, or the category "other" ethnic group were coded together (code 1).

Early tabulations of the variable, MINORITY, found this coding to contain irregularities. Over 23 percent of the sample were characterized as minorities, whereas current minority composition of the entire Nurse Corps is approximately 13 percent. On further examination, it was noted that many individuals (of perhaps Western European background and others) may claim their ethnic heritage by indicating "other" in OMF records. Without denying the cultural heritage of any group, the data sets were restricted to only those ethnic backgrounds identified as official ethnic minorities recognized by the military. After restricting the variable MINORITY to only officially recognized minorities,

approximately eight percent of the sample fit the criteria, which is more in line with the percent minority based on Nurse Corps statistics.

The variable, NONNSG1, is a dummy variable which indicates whether the most recent education noted on the OMF is in the field of nursing (code 0) or not (code 1). The impact of education on promotion can be expected to be positive and to increase over time. To capture this effect, a group of dummy variable are coded to reflect different education levels for each rank. At the Lieutenant level, the variable BACHMIN indicates if at least a Bachelor's degree has been obtained (BACHMIN=1) or not (BACHMIN=0). At the Lieutenant Commander level where a Bachelor's degree is more common, the variable POSTGRAD indicates whether a minimum of 18 credit hours of postgraduate education has been earned (POSTGRAD=1) or not (POSTGRAD=0). At the Commander level, MASTMIN indicated the attainment of at least a Master's degree (=1), or not (=0).

Nursing is a field in which there is a wide range of specialization. In an attempt to identify promotion differences across subspecialties, the NC primary subspecialty codes were used to identify various groups. One such group that may have different promotion patterns is that of nurses who practice relatively independently, such as nurse practitioners and nurse anesthetists. All individuals with a primary subspecialty code indicating such a specialty (codes 1972 to 1981), regardless of letter suffix, were coded 1 for

the variable PRACANES, otherwise coded 0. Another group which could conceivably have an advantage in the military community would be those nurses specializing in fields critical to wartime demands. These could include all nurses with a primary subspecialty in any of several critical care nursing areas, peri-operative (operating room) nursing, or emergency/trauma nursing. Therefore, all nurses with a primary subspecialty code indicating such a specialty (codes 1945 to 1968), regardless of letter suffix, were captured by the variable CCORER, which equalled one for this subspecialty and zero otherwise.

The variable, RESERVE, indicates the individual has not augmented to regular Navy but remains on active reserve status. It is coded 0 for designator 2900 and coded 1 for designator 2905. Dummy variables were also included to capture experience tours for the groups of Lieutenants and Lieutenant Commanders. These three variables were: OVERSEAS, which was coded 1 if the service member had experienced an overseas tour; BIGFOUR, which was coded 1 if the service member had been assigned to one of the four large teaching hospitals (Bethesda, Portsmouth, Oakland, or San Diego); and NONHOSP, which was coded 1 if the service member had been assigned to a non-hospital tour (such as recruiting, corps school, clinics, or a staff billet). Also the variable, GENDER, is included and is coded 0 for female and 1 for male.

Because the NC struggled under the DOPMA restrictions through the 1980s, a variable was included to capture fluctuations over time in the overall NC promotion rate to Lieutenant Commander and Commander. The variable, PRATE, reflected the promotion rate to Commander for the year of in-zone consideration of the observation. It was included in the original Commander selection model, but was not significant and was dropped. The variable, PRORATE, was constructed in the same fashion for the promotion rate to Lieutenant Commander and was included in the Lieutenant Commander selection model. In that model, with the selection rate fluctuating between 60 and 80 percent over the five years of observations in the data set, this variable was significant and maintained in the final model. Promotion opportunity to Captain has been fairly stable over time, so a promotion rate variable was not included for this group.

C. LOGISTIC REGRESSION MODEL

Three logistic regression models were developed (one for the selection to each of the controlled grades of O-4 through O-6) to estimate the probability that a nurse will be selected for promotion to the next higher rank as a function of the independent variables. The logistic regression model is appropriate because the dependent variable was dichotomous and qualitative in nature (selected or not selected) rather than quantitative. In logistic models, the dependent variable is

measured as the log of the odds ratio of the probabilities that a nurse will be selected for promotion. The form of each of these equations is:

$$\ln\left(\frac{P_s}{1-P_s}\right)=\alpha+\beta X_i$$

where:

- P_s is the probability that a nurse will be selected
- α is the intercept
- β is the vector of regression parameters
- X_i is the vector of independent variables for the ith observation

The logistic regression is different from a regression utilizing ordinary least squares, as noted by Pindyck and Rubenfeld:

> The dependent variable in this regression equation is the logarithm of the odds that a particular choice will be made. One important appeal of the logit model is that it transforms the problem of predicting probabilities within a (0,1) interval to the problem of predicting the odds of an event's occurring within the range of the real line. The slope of the cumulative logistic distribution is greatest at P=1/2. This implies that changes in the independent variables will have their greatest effect on the probability of choosing a given option at the midpoint of the distribution. The low slopes near the endpoints imply that large changes in X are necessary to bring about a small change in probability. (ref Pindyck, p.259-260)

As the above quotation implies, the parameter estimates of the logistic regression must be converted to slopes (or first

derivatives) to calculate the change in the probability of selection for a unit of change in an independent variable. A "representative" or "notional" person can also be created to determine the overall promotion probability. The change in probability associated with any given independent variable can then be calculated for this "notional" person. The sign on the parameter estimate indicates whether the variable is associated with an increase or decrease in the probability of selection.

The Statistical Analysis System (SAS) Version 6.07 was used to estimate the model. The Wald statistic was used to test the hypothesis that the parameter estimate is equal to zero, and therefore not contributory to the model. The Wald statistic is a maximum-likelihood chi-square statistic derived from dividing the parameter estimate by its standard error and squaring the result. The probability of exceeding that chi-square statistic through random chance indicates whether the variable may be accepted or rejected for a given significance level. (Turner, 1990, p.60-61)

D. DATA DESCRIPTION

The final data set of 661 Lieutenants were characterized by the following attributes:

- 457 were selected for promotion to Lieutenant Commander, 431 of whom were selected in-zone
- 30 were black, 14 were Hispanic

- 66 belonged to an officially recognized minority group
- 32 had a field other than nursing as the major course of study in their most recent education
- 226 listed a primary subspecialty in an area of critical care, perioperative nursing, or emergency/trauma nursing
- 73 listed a primary subspecialty as a nurse practitioner or nurse anesthetist
- 166 were reserve officers on full-time active duty
- 214 were male
- 559 had a minimum of a Bachelor's Degree
- 446 had served a tour of duty overseas
- 556 had served a tour of duty at one of the big four Naval Hospitals (Bethesda, Portsmouth, San Diego, or Oakland)
- 400 had served a non-hospital tour (i.e., recruiting duty, corps school, clinics command, etc.)
- 374 had served at both an overseas and a big four hospital tour

These findings are summarized in Table III.

The 691 Lieutenant Commanders shared the following attributes:

- 446 were selected for promotion to Commander, 423 of whom were selected in-zone
- 30 were black, 10 were Hispanic
- 57 belonged to an officially recognized minority group
- 103 had a field other than nursing as the major course of study in their most recent education
- 130 listed a primary subspecialty in an area of critical care, perioperative nursing, or emergency/trauma nursing
- 90 listed a primary subspecialty as a nurse practitioner or nurse anesthetist

- 30 were reserve officers on full-time active duty
- 165 were male
- 210 had a minimum of a 18 hours' credit in postgraduate study
- 593 had served a tour of duty overseas
- 593 had served a tour of duty at one of the big four Naval Hospitals (Bethesda, Portsmouth, San Diego, or Oakland)
- 541 had served a non-hospital tour (i.e., recruiting duty, corps school, clinics command, Washington DC, etc.)

Table III. SUMMARY: LIEUTENANT DATA SET

Variable	Frequency	Percent of Total
SELECTED	457	69.1
FIRSTCUT	431	65.2
BLACK	30	4.5
HISPANIC	14	2.1
MINORITY	66	14.6
NONNSG1	32	4.8
CCORER	226	34.2
PRACANES	73	11.0
RESERVE	166	25.1
MALE	214	32.4
BACHMIN	30	84.6
OVERSEAS	446	67.5
BIGFOUR	556	84.1
NONHOSP	400	60.5
TOTAL	661	100.0

These findings are summarized in Table IV.

The 210 Commanders were characterized as follows:

- 105 were selected for promotion to Captain, 97 of whom were selected in-zone
- 6 were black, 3 were Hispanic
- 14 belonged to an officially recognized minority group
- 37 had a field other than nursing as the major course of study in their most recent education

Table IV. SUMMARY: LIEUTENANT COMMANDER DATA SET

Variable	Frequency	Percent of Total
SELECTED	446	64.5
FIRSTCUT	423	61.2
BLACK	30	4.3
HISPANIC	10	1.4
MINORITY	57	8.2
NONNSG1	103	14.9
CCORER	103	14.9
PRACANES	90	13.0
RESERVE	30	4.3
MALE	165	23.9
POSTGRAD	210	30.4
OVERSEAS	593	85.8
BIGFOUR	593	85.8
NONHOSP	541	78.3
TOTAL	691	100.0

- 24 listed a primary subspecialty in an area of critical care, perioperative nursing, or emergency/trauma nursing
- 23 listed a primary subspecialty as a nurse practitioner or nurse anesthetist
- 5 were reserve officers on full-time active duty
- 33 were male
- 98 had at least a Master's degree education

These findings are summarized in Table V.

In the following chapter, the results of the logistic regressions will be presented.

Table V. SUMMARY: COMMANDER DATA SET

Variable	Frequency	Percent of Total
SELECTED	105	50.0
FIRSTCUT	97	46.2
BLACK	6	2.9
HISPANIC	3	1.4
MINORITY	14	6.7
NONNSG1	37	17.6
CCORER	24	11.4
PRACANES	23	11.0
RESERVE	5	2.9
MALE	33	15.7
MASTMIN	98	46.7
TOTAL	210	100.0

IV. RESULTS

The results of the logistic regression for the Commander data set will be presented first, followed by the Lieutenant Commander data set, and Lieutenant data set.

A. COMMANDERS

The data set for Commanders that have been before a Captain selection board included only 210 observations over the eight year period, FY84 through FY91. The logit model expressing the probability of selection for Captain was specified as:

$$\ln\left(\frac{P_s}{1-P_s}\right)=\beta_0+\beta_1 MINORITY+\beta_2 MALE+\beta_3 MASTMIN+\beta_4 NONNSG1+$$
$$\beta_5 CCORER+\beta_6 PRACANES+\beta_7 RESERVE$$

The results of estimating the logit model are displayed in Table VI. Very little information regarding the selection to Captain was obtained by the model as it is specified. Of the 210 observations, only 14 belonged to a minority group and 33 were male. However, the -2 Log L chi-square of 28.7 for the model indicates that the "fit" of the overall model is adequate. The model predicted the outcome of promotion selection with 67.1 percent accuracy, noting 25.9 percent false positive and 35.5 percent false negative results. The inclusion of performance variables created from fitness report

data could be expected to strengthen the forecasting ability of the model.

Only two of the independent variables included in the model were significant (at the 0.10 level or better). The variable, MASTMIN, was significant at the 0.01 level with a positive coefficient. This indicated that possession of at least a Master's Degree increased the likelihood of selection. The variable, NONNSG1, was significant at the 0.05 level with a negative coefficient. This indicated that if the most recent degree obtained was in a non-nursing field, the likelihood of selection decreased.

Table VI. LOGIT REGRESSION RESULTS: COMMANDERS

VARIABLE	PARAMETER ESTIMATE	STANDARD ERROR	WALD CHI-SQUARE	PROB CHI-SQUARE
Intercept	-0.7441	0.2501	8.8480	0.0029
MINORITY	0.6972	0.6161	1.2805	0.2578
MALE	0.0230	0.4227	0.0030	0.9567
MASTMIN	1.6423	0.3518	21.7976	0.0001***
NONNSG1	-0.8872	0.4354	4.1514	0.0416**
CCORER	-0.0370	0.4913	0.0057	0.9399
PRACANES	-0.5360	0.5175	1.0728	0.3003
RESERVE	-0.6574	1.0211	0.4145	0.5197

N=210 -2 Log L : chi-square=28.7 (p=0.0002)

*** significant at 0.01 level
** significant at 0.05 level

To relate the change in probability of selection to a unit change in one of the variables, one must first calculate the probability of selection for the base case. The probability of promotion in the logit model can be rewritten as:

$$P_s = \frac{1}{1+e^{-(\alpha+\beta X_i)}}$$

The probability of selection can be calculated by inserting the appropriate value of $(\alpha+\beta X_i)$ from the estimated logit model. In the base case, only the α, or intercept remains if the other variables are coded to be zero. One can then change the base case by changing a given variable (here, from zero to one to signify a certain characteristic) and re-calculating the probability. By subtracting the new probability from that of the base case, one can determine the change in probability that occurs with a unit change in each of the independent variables.

The base case for this model was a white female Commander, who belongs to none of the officially recognized ethnic groups, does not hold a Master's degree but whose major in her most recent education was in the field of nursing, holds a subspecialty, the code of which is less than 1945, and has augmented into the regular Navy. After probabilities were calculated for this base case, the following changes in probabilities were noted: 1) holding a Master's degree (MASTMIN) increased the probability of selection by 39

percent; 2) if the most recent education recorded was in a major other than nursing (NONNSG1), the probability of selection was decreased by 16 percent.

While the variables used in the model were not very helpful in predicting selection to Captain, it may be of interest to note the results of cross-tabulating the dependent variable, FIRSTCUT, with the variables MINORITY and MALE, which are shown in Table VII. While the overall selection rate for the group was 46.2 percent, the selection rate for members of minority groups was 57.1 percent. However, it should be noted that the small sample size for minorities (14) may influence the reliability of these percentages. The selection rate for males was 45.5 percent.

B. LIEUTENANT COMMANDERS

The data set for Lieutenant Commanders who had been before a selection board for Commander consisted of 691 observations

Table VII. CAPTAIN SELECTION RATE BY CATEGORY

	Total	Minority	Male
Number selected/number in category	97/210	8/14	15/33
Percent selected	46.2	57.1	45.5

over the eight year period FY84 through FY91. The model expressing the probability of selection to Commander was specified as:

$$\ln\left(\frac{P_s}{1-P_s}\right)=\beta_0+\beta_1 MINORITY+\beta_2 MALE+\beta_3 POSTGRAD+\beta_4 NONNSG1+$$
$$\beta_5 CCORER+\beta_6 PRACANES+\beta_7 RESERVE+\beta_8 OVERSEAS+\beta_9 BIGFOUR+\beta_{10} NONHOS$$

Included in the data set were 57 members of minority groups and 165 males. The results of the logit model are presented in Table VIII. The model performed significantly better for this group than for Commanders. The -2 Log L chi-square of 89.4 for this model indicates that forecasting selection is enhanced by the variables to a significant degree. The model predicted the outcome of promotion selection with 66.4 percent accuracy, noting 30.9 percent false positive and 40.6 percent false negative results. Here again, the inclusion of performance variables created from fitness report data could be expected to strengthen the forecasting ability of the model.

Seven of the ten variables included in the model were significant at the 0.1 (or better) level. The variable, POSTGRAD, was significant at the 0.01 level and had a positive coefficient. This indicated that having at least 18 hours of postgraduate study increased the likelihood of selection to Commander. The variable, NONNSG1, was significant at the 0.01 level and had a negative coefficient. This indicated that having a major in a field other than nursing for the most

recent educational degree decreased the likelihood of selection to Commander. The variable, PRACANES, was significant at the 0.05 level with a positive coefficient. This indicated that having a subspecialty as a nurse practitioner or nurse anesthetist increased the likelihood of selection. The variable, RESERVE, was significant at the 0.1 level with a negative coefficient. This indicated that if one had not yet augmented to the regular Navy by this point the likelihood of selection was decreased. The variable, OVERSEAS, was significant at the 0.05 level and had a positive coefficient. This indicated that an overseas experience tour prior to the selection board increased the likelihood of selection to Commander. The variable, BIGFOUR, was significant at the 0.05 level and had a positive coefficient. This indicated that an experience tour at one of the big four teaching hospitals (Bethesda, Portsmouth, San Diego, or Oakland) prior to the selection board increased the likelihood of selection to Commander. The variable, NONHOSP, was significant at the 0.01 level and had a positive coefficient. This indicated that an experience tour at a non-hospital assignment (such as recruiting, corps school, clinics, or staff billet) prior to the selection board increased the likelihood of selection to Commander.

The following variables were found to be insignificant: MINORITY, which indicated the member belonged to a minority group officially recognized by the military; MALE; and CCORER,

Table VIII. LOGIT REGRESSION RESULTS: LIEUTENANT COMMANDERS

Variable	Parameter Estimate	Standard Error	Wald Chi-Square	Prob Chi-Square
Intercept	-1.2630	0.3345	14.2566	0.0002***
MINORITY	0.3077	0.3120	0.9728	0.3240
MALE	-0.0653	0.2033	0.1032	0.7481
POSTGRAD	1.6362	0.2583	40.1226	0.0001***
NONNSG1	-0.8079	0.3063	6.9588	0.0083***
CCORER	0.0678	0.2189	0.0960	0.7566
PRACANES	0.5915	0.2690	4.8343	0.0279**
RESERVE	-0.7744	0.4135	3.5066	0.0611*
OVERSEAS	0.5208	0.2384	4.7722	0.0289**
BIGFOUR	0.5097	0.2373	4.6115	0.0318**
NONHOSP	0.6047	0.2015	9.0115	0.0027***

N=691 -2 Log L : chi-square=89.4 (p=0.0001)

*** significant at 0.01 level
** significant at 0.05 level
* significant at 0.1 level

which indicated that the member had a primary subspecialty in critical care, perioperative nursing, or emergency/trauma nursing.

The base case for this model was a white female Lieutenant Commander, who belongs to none of the officially recognized ethnic groups, has not recorded 18 hours of postgraduate study, but whose major in her most recent education was in the field of nursing, holds a subspecialty, the code of which is less than 1945, has augmented into the regular Navy, and has

not had an experience tour overseas, at one of the big four teaching hospitals, or at a non-hospital setting. After the promotion probability was calculated for this base case, the following changes in this probability (as summarized in Table IX) were noted: 1) the addition of the specified postgraduate study increased the probability of selection by 37 percent; if the most recent study recorded was in a field other than nursing, the probability of selection was decreased by 11 percent; if the officer held a subspecialty as a nurse practitioner or nurse anesthetist, the probability of selection was increased by 12 percent; if the officer had not augmented to the regular Navy, the probability of selection was decreased by 11 percent; if the officer had an overseas tour, the probability of selection was increased by 10

Table IX. CHANGE IN PROBABILITY: SELECTION TO COMMANDER

Variable Name	Percent Change in Probability	Direction of Change
POSTGRAD	37	increase
NONNSG1	11	decrease
PRACANES	12	increase
RESERVE	11	decrease
OVERSEAS	10	increase
BIGFOUR	10	increase
NONHOSP	12	increase

percent; if the officer had a tour at one of the big four teaching hospitals, the probability of selection was increased by 10 percent; and if the officer had a tour in a non-hospital setting, the probability of selection was increased by 12 percent.

In Table X, the dependent variable, FIRSTCUT, is cross-tabulated with the variables MINORITY and MALE. The overall selection rate for the group was 61.2 percent, while the selection rate for members of minority groups was 66.7 percent and the selection rate for males was 60.6 percent.

Table X. COMMANDER SELECTION RATE BY CATEGORY

	Total	Minority	Male
Number selected/number in category	423/691	38/57	100/165
Percent selected	61.2	66.7	60.6

C. LIEUTENANTS

The data set for Lieutenants who had been before a selection board for Lieutenant Commander consisted of 661 observations over the five year period FY87 through FY91. The model expressing the probability of selection to Lieutenant Commander was specified as:

$$\ln\left(\frac{P_s}{1-P_s}\right)=\beta_0+\beta_1 MINORITY+\beta_2 MALE+\beta_3 BACHMIN+\beta_4 NONNSG1+$$
$$\beta_5 CCORER+\beta_6 PRACANES+\beta_7 RESERVE+\beta_8 PRORATE+$$
$$\beta_9 OVERSEAS+\beta_{10} BIGFOUR+\beta_{11} NONHOSP$$

Included in the data set were 66 members of minority groups and 214 males; the results are summarized in Table XI. This model also performed well, with a -2 Log L chi-square value of 143.9. The model predicted the outcome of promotion selection with 73.5 percent accuracy, noting 22.4 percent false positive and 36.0 percent false negative results. Again, it could be expected that the inclusion of performance variables created from fitness report data would strengthen the forecasting ability of the model.

Seven of the eleven variables included in the model were significant at the 0.1 level or better. The variable, MINORITY was significant at the 0.05 level and had a negative sign on the coefficient. This indicated that, given the variables included in the model, belonging to a minority group tended to decrease the likelihood of selection to Lieutenant Commander. The variable, MALE, was significant at the 0.1 level and also had a negative sign. This indicated that being male tended to decrease the likelihood of selection to Lieutenant Commander. The variable, PRACANES, was significant at the 0.01 level with a positive coefficient. This indicated that having a subspecialty as a nurse practitioner or nurse anesthetist increased the likelihood of selection. The

variable, RESERVE, was significant at the 0.01 level with a negative sign on the coefficient. This indicated that if one had not yet augmented to the regular Navy by this point the likelihood of selection was decreased. The variable, OVERSEAS, was significant at the 0.01 level and had a positive sign. This indicated that an overseas experience tour prior to the selection board increased the likelihood of selection to Lieutenant Commander. The variable, NONHOSP, was significant at the 0.1 level and had a positive coefficient. This indicated that an experience tour at a non-hospital assignment (such as recruiting, corps school, clinics, or staff billet) prior to the selection board increased the likelihood of selection to Lieutenant Commander.

The variable, PRORATE, was significant at the 0.1 level and had a negative sign. This indicated that the overall promotion rate allowed to the rank of Lieutenant Commander during those years was a significant factor in selection, and that the opportunity tended to decrease over time. This reflects official NC statistics which indicate that promotion opportunity was 75 percent in FY87, decreased to 60 percent by FY89, and only reached the original level or greater in FY91 (with 80 percent promotion opportunity to Lieutenant Commander that year).

The following variables were found to be insignificant: BACHMIN, which indicated the member had a minimum of a Bachelor's Degree; NONNSG1, which indicated the member's most

Table XI. LOGIT REGRESSION RESULTS: LIEUTENANTS

Variable	Parameter Estimate	Standard Error	Wald Chi-Square	Prob Chi-Square
Intercept	0.3856	0.4037	0.9122	0.3395
MINORITY	-0.6516	0.3008	4.6931	0.0303**
MALE	-0.3803	0.2079	3.3453	0.0674*
BACHMIN	0.2474	0.2509	0.9722	0.3241
NONNSG1	-0.6015	0.4106	2.1466	0.1429
CCORER	-0.1388	0.1954	0.5046	0.4775
PRACANES	2.4237	0.5123	22.3851	0.0001***
RESERVE	-1.6381	0.2134	58.9233	0.0001***
OVERSEAS	0.5853	0.1995	4.6931	0.0034***
BIGFOUR	0.1346	0.2589	0.2703	0.6031
NONHOSP	0.3302	0.1906	3.0007	0.0832*
PRORATE	2.2086	1.3591	2.6408	0.1042*

N=661 -2 Log L : chi-square=143.9 (p=0.0001)
*** significant at 0.01 level
** significant at 0.05 level
* significant at 0.1 level

recent education was in a field other than nursing; BIGFOUR, which indicated that the member had served an experience tour at one of the big four teaching hospitals; and CCORER, which indicated that the member had a primary subspecialty in critical care, perioperative nursing, or emergency/trauma nursing.

The base case for this model is represented by these characteristics. The officer is a white female Lieutenant, who belongs to none of the officially recognized ethnic

groups. She holds a hospital diploma, and may be working on a Bachelor's degree but has not yet achieved it. Her major in her most recent education was in the field of nursing. She holds a subspecialty, the code of which is less than 1945, and has augmented into the regular Navy. She has not had an experience tour overseas, at one of the big four teaching hospitals, or at a non-hospital setting. Lastly, she was in-zone for selection at the FY87 board.

After the promotion probability was calculated for this base case, the following changes in the probability (as summarized in Table XII) were noted: 1) if the officer belonged to a minority group, the probability of selection was decreased by 16 percent; if the officer was male, the probability of selection was decreased by nine percent; if the officer held a subspecialty as a nurse practitioner or nurse anesthetist, the probability of selection was increased by 34 percent; if the officer had not augmented to the regular Navy, the probability of selection was decreased by 37 percent; if the officer had an overseas tour, the probability of selection was increased by 13 percent; if the officer had a tour in a non-hospital setting, the probability of selection was increased by eight percent.

If the year in which the officer was in-zone for selection was FY88, the probability of selection was decreased by five percent, everything else being equal; if that year was FY89, the probability of selection decreased eight percent; if that

Table XII. CHANGE IN PROBABILITY: SELECTION TO LIEUTENANT COMMANDER

Variable Name	Percent Change in Probability	Direction of Change
MINORITY	16	decrease
MALE	9	decrease
PRACANES	34	increase
RESERVE	37	decrease
OVERSEAS	13	increase
NONHOSP	8	increase

year was FY90, the probability of selection decreased three percent; and if that year was FY91, the probability of selection increased three percent.

Cross-tabulations of the dependent variable, FIRSTCUT with the variables MINORITY and MALE, indicated the overall selection rate for the group was 65.2 percent. The selection rate for members of minority groups was 50.0 percent and the selection rate for males was 66.8 percent (see Table XIII).

Table XIII. LIEUTENANT COMMANDER SELECTION RATE BY CATEGORY

	Total	Minority	Male
Number selected/number in category	431/661	33/66	143/214
Percent selected	65.2	50.0	66.8

A summary of this study will be presented in the following chapter. Conclusions and recommendations are also presented.

V. CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

The Navy Nurse Corps has been successful in attracting men and minorities in numbers considerably higher than in the national population. The Nurse Corps, as of the end of FY91, was comprised of 6.0 percent black nurses and 3.1 percent Hispanic nurses, compared to national percentages of 3.6 percent and 1.3 percent, respectively. While the national proportion of men in nursing is only 3.3 percent, men account for approximately 26 percent of the NC. (ANA, 1991; DMDC, 1991)

Promotion opportunities in the NC were profoundly affected by the passage of the DOPMA legislation in 1981. The number of personnel in the newly controlled grades of Lieutenant Commander, Commander, and Captain immediately exceeded the authorized end-strength. In an attempt to bring these grades within limits, promotion rates were reduced and flowpoints to the senior ranks increased. The NC has still not fully recovered from this massive manpower jolt.

Unfortunately, this curtailment of promotion opportunities occurred just as minorities and men were making strides in the senior ranks of the NC. For the first time these nurses were reaching positions of leadership, such as Director of Nursing

Services and Commanding Officer. These achievements were not only important for the individual, but also provided role models for junior officers.

This thesis attempted to determine statistically whether men and minorities in the Navy Nurse Corps face the same promotion opportunities to the controlled grades as females and whites. The data were drawn from the Officer Master Files and the Officer Summary Records of nurses whose records have been before these promotion boards. A separate multivariate logistic regression was estimated for Lieutenants, Lieutenant Commanders, and Commanders modelling promotion as a function of various demographic and experience/education factors. The results of the statistical analysis are reviewed below along with policy recommendations and suggestions for further research.

B. COMMANDERS

Estimation of the model for the Captain selection boards was hampered by several problems. First, the data set reflected the pyramid structure of this relatively small staff corps. With only 210 observations over an eight year period, this data set contained only 14 (6.7 percent) minority nurses and 33 (15.7 percent) men. Second, the criteria for selection to Captain were somewhat unclear and quite possibly were not the same as those for Commander or Lieutenant Commander.

Given the above limitations, only two explanatory variables were significant in this model. The holding of a Master's degree increased the probability of selection by 39 percent, while a major in a field other than nursing decreased the probability of selection by 16 percent. The other factors, including minority status and gender, were statistically insignificant in the logit model for this promotion point.

The perception among minority nurses of "decreased percentage of selection to higher ranks..." is evident in the Ethnic Minority Navy NC Study Group Report (Bureau of Medicine and Surgery, August, 1991), and this researcher has observed similar perceptions among many men in the NC. This model, however, supports the theory that promotion opportunities at the Captain selection point are the same for men and minorities as for females and whites. The fact that the representation of minority groups at this level is low may reflect the recruitment and retention patterns of twenty to thirty years ago.

It is suggested that the Nurse Corps use the results of this study in an effort to change negative perceptions of promotion rates at this level. A positive change in the perceptions of junior officers may increase their likelihood of staying in the Navy, particularly among minority nurses.

The lack of information regarding criteria for selection to Captain may also play a role in the negative perception of

promotion opportunities. Without guidance from the organization as to which qualities and attributes are important, members are left to draw their own, possibly inaccurate, conclusions. Further research is recommended to identify more fully the factors involved in selection to Captain.

C. LIEUTENANT COMMANDERS

The model for selection to Commander performed considerably better than that for selection to Captain. The data set contained 691 observations including 57 (8.2 percent) minority nurses and 165 (23.9 percent) men. Seven of the ten explanatory variables were statistically significant. Those variables that were associated with an increased probability of selection in this model were: postgraduate education (37 percent increase), a subspecialty of nurse practitioner or nurse anesthetist (12 percent increase), and experience tours overseas (10 percent increase), or at one of the big four hospitals (10 percent increase), or at a non-hospital billet (12 percent increase). Those variables that were associated with a significant decrease in the probability of selection in this model include: holding a major in a field other than nursing (11 percent decrease), and failure to augment into the regular Navy (11 percent decrease). The three variables in this model that were insignificant were minority status,

gender, and holding a subspecialty in critical care, peri-operative, or emergency/trauma nursing.

These results support the theory that the promotion opportunities of men and minorities are the same as for women and whites at the Commander selection point. These results also mirror quite closely the common career advice regarding promotion criteria--pursue advanced education, pursue a wide variety of experiences, and augment to the regular Navy.

While the representation of minorities and men is higher in this data set than the data for Commanders, the impact of recruitment and retention patterns of eighteen to twenty years ago cannot be ignored. Information regarding minority and male recruitment in the 1970s, as well as the retention rates through the current time, is needed before these figures are judged as representative or not. Negative perceptions of minority members regarding the representation of minority groups at the O-5 level may stem from applying today's recruitment and retention rates to those earlier year groups who have grown to the point of Commander consideration. It is, again, suggested that the Nurse Corps use the results of this study in an effort to change negative perceptions of promotion rates at this level.

D. LIEUTENANTS

The model for selection to Lieutenant Commander also performed well. The data set contained 661 observations,

including 66 (10.0 percent) minority nurses and 214 (32.4 percent) men. Seven of the eleven explanatory variables in the model were statistically significant. Those variables associated with an increased probability of selection in this model were: a subspecialty of nurse practitioner or nurse anesthetist (34 percent increase), and experience tours overseas (13 percent increase) and at a non-hospital billet (8 percent increase). Those variables associated with a decreased probability of selection in this model included: minority status (16 percent decrease), male (9 percent decrease), and the failure to augment into the regular Navy (37 percent decrease). A variable that was included to capture the effects of the overall promotion opportunities to Lieutenant Commander was also significant in the model. The four variables in this model that were insignificant were: holding a Bachelor's degree, pursuing a non-nursing major in the most recent education, pursuing a subspecialty in critical care, peri-operative, or emergency/trauma nursing, and completing an experience tour at one of the big four hospitals.

These results do not support the theory that promotion opportunities for minorities and men are the same as women and whites at the Lieutenant Commander selection point. Further research is recommended to identify the likely causes of these differences. One area of future research suggested is an investigation of fitness report information to analyze

differences in performance by gender and minority status. Such data were not included in this model; however, fitness report marks are a factor that is considered in the selection process.

It is interesting to compare these findings with the studies cited in the letter regarding bias in fitness reports from the Surgeon General mentioned in the second chapter (Bureau of Medicine and Surgery, 1991). That letter addresses minority but not gender status. However, that letter states, in part, "The largest disparity of [fitness report] marks is at the Lieutenant level, resulting in minorities having a higher failure to promote or screen to O-4, O-5, executive officer, and command." While this study did identify differences in promotion rates at the Lieutenant Commander level, this study differs from the conclusions indicated in the quotation in that no differences were observed at the Commander or Captain level.

Whatever the reason, minorities and men appear to have somewhat lower probabilities of being promoted to Lieutenant Commander, holding all else in this model equal. Since the data do not indicate differences in promotion probabilities at the Commander or Captain level, it may be that the previous selection process at the O-4 level has screened out those who are marginal performers. Such marginal performance level, if present, may be related to the problems of minority and male nursing students mentioned in the literature review section of

the thesis. Further research is recommended to clarify the likely causes of differences in performance, if any, at this levels.

Further research is also recommended regarding the retention of minorities in the Nurse Corps. If retention among junior officers differs by race or ethnic group, investigation into the reasons surrounding the loss may shed light on problem areas. Once these areas are identified, corrective measures can be initiated.

As medical science advances and the number of beneficiaries of military medicine increase, every Navy nurse represents an investment of talent and training that is valuable to the system. Minorities and men in nursing contribute not only their labors, but a perspective toward the patient and the profession that enriches the delivery of medical care throughout the system. Therefore, every effort should be made to retain these nurses in the Navy and help them succeed.

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